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M. DE LESSEPS AND HIS CANAL.

THERE appears in the January number of the "Review" a contribution by M. de Lesseps, to which I feel disposed to reply. The same ideas have been more elaborated in the "Bulletin du Canal Interoceanique," published in Paris under his immediate control. I have not replied, as these articles appeared, from a willingness that he shall have it all his own way where his language is spoken, or abroad where he is regarded as especially authorized to instruct. If he can find in Europe a moneyed support, and particularly in France, it is not our affair. When he writes in English, and publishes his ideas in one of the leading periodicals of my country, he not only invites but challenges a reply.

Months ago we were informed of what he had to say before the Geographical Society of Paris; he expressed surprise and even disappointment at finding so little opposition; it was a regret to him that he could not secure a controversy on the canal question, and appeared, as the Irishman is represented at the Donnybrook Fair, most anxious "to find some gentleman who would do him the favor to step on the tail of his coat."

Without specially wishing to perform that office, I purpose pursuing my way quite regardless of other objects than a fair discussion, and shall confine myself as far as possible—1. To a review of the points presented for American consideration; 2. To some points he does not present; 3. To the general merits of the question growing out of his presentations. And I beg my readers to take note—in explanation of my frequent allusions to M. de Lesseps—that that gentleman's connection with the Panama Canal enterprise is about all that gives it importance in France.

It is gratifying to see that M. de Lesseps states that our Government for a long series of years has recognized the advantage,

and endeavored to promote the knowledge necessary to solve the possibilities of an interoceanic ship-canal ; this is taking a proper step. If published in Paris it would appear as a contradiction or a revelation of what we had been about for the past quarter of a century.

On page 3 M. de Lesseps says : "In the examination made of different projects in the United States, the only plan thought of has been to make use of inland waters for constructing a maritime canal, and they have entirely neglected to study the methods by which they would secure a constant level of sea-water for the purposes of navigation in a channel from one ocean to the other."

This does not comport with M. de Lesseps's opening acknowledgments of the interest taken by our Government and people in this question ; it is not only at variance with the facts, but what are known to be the facts to every intelligent American. Such an averment emanating from him might find believers in France, but with us will excite either a feeling of ridicule or of indignation. He states this in the face of his averment that we have spent five million dollars in making surveys across the isthmuses—in the face of the presentations to the Congress of our surveys, extending over the whole regions involved, without the existence of which he would have suffered the perplexities of M. Drouillet.

The assertion of M. de Lesseps is made in the full knowledge and possession of a line of levels and best location possible for a ship-canal across the Isthmus of Panama, carefully made, as he was informed, by Mr. Menocal in the Congress, without any preconceived height, if at all, above the ocean-level. The summit-level arrived at was the result of a necessity that was found apparent.

The following extract from the orders of Commander Lull shows how far M. de Lesseps is in error in his quoted assertion I am now discussing. His orders were prepared by the Commission, although signed by the Secretary of the Navy.

NAVY DEPARTMENT, WASHINGTON, D. C., *December 29, 1872.*

SIR: Upon the request of the Interoceanic Canal Commission for more specific information in relation to the Isthmus of Panama, in general in the vicinity of the line of railroad, you are detailed, and will proceed in the steamer of January 2d, from New York for Aspinwall, with the party of officers ordered to report to you.

Your thorough experience in these matters relieves the Department from preparing minute and contingent instructions. You will, however, obtain specific information on the following points, viz. :

1. In relation to water-supply and the points whence it should be drawn for an interoceanic canal, if constructed upon the Isthmus of Panama.

2. The difficulties that may exist from floods.

3. Actual locations of the most practicable line or lines, with locations of locks, if the route, upon examination, should render this advisable.

4. Observation as to whatever in the way of material or other conditions would look to the general question of construction, whether of advantage or disadvantage.

5. To obtain in advance from the Panama Railroad Company whatever information as to levels, *known to be authentic*, the company may be disposed to give you, which may form a basis for your special careful instrumental examination.

6. By the aid of a tug, and whatever other facilities may be necessary to enter the Chepo River, making such examinations of it as may be thought advisable after inspection. It is suggested, if the near approach of massive, solid ground on both sides of the Chepo should make it possible by dams to flood considerable areas and distances for slack-water navigation, that it might be found practicable in connection with a tunnel of considerable length to the Gulf of San Blas. If the prosecution of this examination should be found advisable, put it in such a shape as will not lead to doubts as to relative practicability.

It was only after a full consideration of all the routes surveyed, and the belief of the Commission that no others existed equal to those that had been developed, that it sent in its report of preference for the Nicaragua route, as the above facts abundantly establish, notwithstanding the ideas of M. de Lesseps to the contrary.

There is nothing more potent than a grievance. M. de Lesseps presents one. It is nothing less than that the Congress which he invoked had not been furnished with all of the means by which the Commission appointed by the President of the United States had arrived at a decision respecting the merits of the different routes. This "exclusively American Commission" was appointed under an act of Congress to obtain and report upon all necessary information touching the question of the practicability of an interoceanic ship-canal across this continent. To enable it to carry out the expressed objects in the progress of the work, it thought necessary to ask a personal inspection of the routes by able engineers for *its information*, in order the better to form an opinion as to the relative cost of execution, over which it was supposed actual lines of location existed. These inspections were made, and revealed the fact that the Atrato-Napipi route located by Commander Selfridge was almost wholly supposititious, and that the Nicaragua route located by

Commander Lull presented all the elements of calculation for an engineer.

The Commission endeavored in vain to get from or through the Panama Railroad surveys for a canal, said to have been made by Colonel Totten. As far as I know, only partial lines were made by him for that object.

Finding it impossible to get the information otherwise than through an instrumental survey, the Commission stated to the President of the United States its inability to arrive at a conclusion without it, and our Government immediately directed its execution in a manner quite satisfactory to the Commission, by the commanding officer and civil engineer who had executed the surveys of the Nicaragua route, thus obviating a further examination of them for comparison as to cost of execution.

The Government also directed the making of an actual line of location *via* the Atrato-Napipi route by Lieutenant Collins, U. S. Navy, a very able and reliable officer, as the results of his surveys show.

The Commission then examined carefully into all the work done, and sent to the President its report, journal of proceedings, and copies of all of the surveys and inspections, upon which it based its decision. The surveys of the Panama and Atrato routes were published especially for and sent by our Government to the Paris Congress. Our Government did not furnish the journal of the Commission nor the long reports of the engineers sent over the two routes above named, *not as a board*, but to give their individual opinions *for the information and guidance of the Commission*. The value of this information was duly acknowledged in their report, of which copies were furnished the Congress. Has M. de Lesseps a real or an imaginary grievance? Has the "exclusively American Commission" indulged in ways that are dark, as is inferred?

In due time I shall revert to his parade of the candor and ingenuousness of the Congress considering that subject, in the light of papers which I think he will agree with me are not to be found even in the libraries of the Geographical Society of Paris.

There is an old proverb that it is not polite to look a gift-horse in the mouth. There was no moral obligation on the part of our Government to furnish M. de Lesseps and his Congress with any surveys; there would have been neither reason nor object in using duplicity. He was furnished with all the information in our possession, and was at liberty to assign any value to it that he thought

proper. In relation to the cost of these surveys, I wish to correct an error. He gravely asserts the expenses incurred through making them was \$5,000,000.

In 1870 an appropriation of \$40,000 was transferred, which furnished instruments, engineers, draughtsmen, hired labor, extra rations, shelter-tents, etc., for the Tehuantepec and Nicaragua surveys, and for all those made by Commander Selfridge. The special expenses necessary for the objects above named for instrumental surveys of the Panama route by Commander Lull and for the Atrato-Napipi route by Lieutenant Collins, amounting to about \$10,000, were met by the navy contingent fund, in great part, at least, very little of the \$40,000 appropriation remaining unexpended.

No expenses were entailed on the Government through the diversion of vessels of war from their ordinary duties as cruisers to "special duty" to aid in these surveys. The cost of publication was defrayed by special appropriations, probably amounting to \$50,000. As M. de Lesseps's statement of the expenditures made as a consequence of these surveys is preposterous, the public would be pleased to know the source of his misinformation.

Referring to page 5, we find M. de Lesseps compliments General Türr and others, who formed an initiatory society, of which we shall know more before the close of this paper. He says, "In that company I have taken no part whatever."

In April of 1866 a M. Gogorza sought my acquaintance and informed me that he knew a low line of levels across the Isthmus of Darien. I expressed my gratification, and was informed that he sought an interview with General Grant, to lay the whole matter before him. I replied that I knew General Grant took great interest in that subject, and hoped that I could arrange this as he desired. In short, General Grant sent an officer then on his staff to see M. Gogorza, who showed partial maps, and finally said that he was unwilling to give up his great secret, as he would then be quite in the power of those who were possessed of it. Some years after I received a note from him, urging haste, without which his precious information would fall into the hands of Europeans, a calamity that he was most anxious to prevent. Perhaps somewhat in an Anglo-Saxon manner I replied that I would have nothing to do with a mere pretender. I had placed him years before in communication with General Grant, and he had failed to carry out his expressed purpose.

During the fall of 1876, after I had prepared a paper which was

read October 31st before the Geographical Society of New York, the Secretary of State presented me a pamphlet by M. Gogorza, who at length had given the world his great secret. I stated that I had a personal acquaintance with this individual, and pointed out, by the height he gave the mouth of the river Paya above the sea-level, that what was asserted as a fact was a mere fallacy. A foot-note, read before the Society referred to, exposed the pretension of Gogorza. I may as well add that the paper was prepared for the purpose of showing the sufficiency of our information respecting the Isthmus to controvert the assumptions of M. Drouillet, French engineer, and the first Secretary of the Initiatory Society. He visited our country to invoke the aid of our learned societies in a "generous attempt" to explore these (to him) unknown regions, in relation to which he had vainly endeavored to inform himself for the past five years, but could not, by reason of the information being entirely contradictory!

In addition to being possessed of "valuable information," M. Gogorza held a provisionary grant from the Colombian Government. Hence we see his title to a very considerable share of the proceeds of the Initiatory Society before alluded to—not resulting, however, from the benefit derived from his "information," for we find that Lieutenant Wyse, after all, did agree with me that the Tuyra-Tupisa route was impossible for a canal, as shown in my paper of November, 1878. Yet he compliments Gogorza on his services, and himself visited Bogota twice to secure desired amendments to the concession, which at length were obtained. In reading the papers of the Initiatory Society, it seems that M. Gogorza was like Esau, not in the matter of a hairy coat, but in the value that he attached to a mess of pottage—General Türr, the brother-in-law of Lieutenant Wyse, supplying (figuratively) the coveted article. The Paris Congress was then called—not, however, until ten days' labor in running a dozen cross-sections over the levels of the Panama Railroad had opened up that unknown region, and had established the practicability of a ship-canal *à niveau*, the plans for which received such high commendations from M. de Lesseps in that august body.

Now the intelligent reader will be prepared to compare the supposed hidden, devious ways of the American Commission with the interesting and much-vaunted preliminaries to and proceedings in the Paris Congress, as shown in the "Articles of Agreement of the International Society for cutting an Interoceanic Canal through the Isthmus of Darien" (see Appendix).

Considering M. de Lesseps's apology for us, based on the very humble ideas held by the American Commission by reason of small sailing-vessels and rudimentary steamers forming our commercial marine, and calling at the same time our attention to the grand dimensions and purposes of steam marine in Europe, it may naturally be supposed that the attention of persons who may interest themselves in the canal project will be directed to a provision for the transit of longer vessels, through the construction of sufficient locks and curves of longer radii. His ideas as to locks and lockage, however, are very crude, or, to speak with more propriety, his citation of a lock at Bordeaux as "a vast improvement ; and yet, great as it is, the Congo, of the Transatlantic line, occupied an hour and a half in passing it," shows so deplorable a want of efficiency in that respect that it excites surprise.

In this country, the commerce of which, in the opinion of M. de Lesseps, is confined to small sailing-vessels and steamers of small or rudimentary development, a lift-lock is now near completion at St. Mary's, Michigan, five hundred and fifteen feet in length, sixty feet width of gate, and eighteen feet lift. The computed time of a steamer entering into and passing through the lock is *eleven minutes*. The constructor is General Weitzel, United States Engineers, who has been engaged for the past twelve years in constructing and operating locks of large dimensions. Without intending disparagement to the many able men who attended the Paris Congress, I will add that, in this department of engineering, he may be regarded as the equal of any.

M. de Lesseps found, notwithstanding the "information" and services of M. Gogorza, that only after the researches on the Isthmus of Panama "the time had arrived for realizing the wish of 1875, namely, to convene a national congress to which all the investigations made and all the plans proposed should be submitted. . . . I sent an invitation to all the chambers of commerce and scientific societies without making any appeal to governments, and on our sole invitation everybody came." Mr. Menocal and myself were ordered by our Government to attend the Congress. We met many other officers of foreign Governments who occupied the same position as ourselves. Can any intelligent person believe that our Government, without invitation or request, sent delegates to this meeting?

On May 23d M. de Lesseps addressed the Congress as follows (p. 638) : "In my belief we should not make a canal with locks at

Panama, but a canal at the sea-level ; that is, I believe, the public opinion of which I am the organ at this moment."

The Congress obligingly conformed to his expressed wishes ; he was the organ of "public opinion," and he charged himself with the execution of the work. I am not disposed to reply either affirmatively or negatively to the question, "Can any one assert that the Nicaragua project was not sufficiently examined?" If the Congress and its President are satisfied with the examination, it would be idle and captious to dissent. If they are satisfied with the decision, we are also ; the question of whether engineering considerations supported the decision is quite another question. M. de Lesseps presents the case as though there were only an American support to the canal *via* Nicaragua, and excuses us for our apparent want of comprehension of a grand idea. The question has been discussed in the Society of Civil Engineers of France ; it would be simply a narrow prejudice not to recognize that body as the equal of any on the globe.

It is worth while to state with precision the character and attainments of an able civil engineer. He is a man eminently gifted with a perception of the forces of nature in their varied forms, and is thoroughly educated in the means and devices which will permit of using them as far as possible, and, when a question arises of antagonizing them, to do so with the greatest economy ; he is thoroughly an economist, and supports that which is best for any proposed purpose in all its bearings. Like the jurist, he belongs to no land ; knows no special pleading ; recognizes and sustains only what he regards the *truth* under all conditions, and ignores the fact that his personal interests may suffer thereby. In this connection I may say no one of the five able engineers, delegates to the Congress from the Society of Civil Engineers of Paris, supports "public opinion" and its organ. They and many other eminent French engineers were *absent* when the vote was taken, or voted *no*.

On the 20th of June, in Paris, this Society was addressed by two of those delegates, M. Cotard and M. Lavalley. After hearing all this discussion, M. de Lesseps is still pleased to hold up the canal *via* Nicaragua as wholly an American idea, that existed in fact only from a want of comprehension of the grand problem solved by Wyse and Reclus, the discoverers of the possibilities of Panama. If any one will take up the journal of the proceedings of that day, he will not have to *suspect* why M. de Lesseps is silent in regard to it.

The very high and deserved compliments paid to M. Lavalley as an engineer by M. de Lesseps (see page 637 of the proceedings) would lead to the supposition that sufficient value would be attached to his opinion to insure a remembrance that it had been expressed at length, and was supported by several of the very able engineers present in the discussion referred to. I submit the question if it is quite ingenuous to present to the American public the idea that the Nicaragua project has no other than an American support, when it has the support of such eminent and able engineers in France?

It fails to have the support of M. Dauzats, Chief Engineer of the Suez Canal, who has gained his experience under the tutorage of his illustrious patron. He has recently written a pamphlet, in which, by an able and skillful adaptation of a flood that occurred on the Suez Canal, as a measure of the conditions required on the Isthmus of Panama, he has, in his belief, settled the feasibility of a canal *à niveau, via Panama*. Now, to satisfy the public at large, and especially in this country, an additional measure is suggested—that of the relative magnitude of the Suez flood and the one which submerged the Panama Railroad from the 20th to the 29th of November last, and bearing steadily in mind that the average yearly rainfall at Panama is one hundred and twenty-four inches, and Suez one inch and a third.

The "Report of Congress," a beautiful volume of 700 pages, is declared "a monument of science erected in a fortnight." I have on a former occasion spoken of the many able men whom I had the honor to meet in that assemblage; of its composition as a whole there are diverse opinions. A pamphlet published in Paris with the title of "400,000,000 à l'eau," gives the following:

"Let it be remarked that one half of the Congress were French; they had been chosen by the organizers of that assembly; thirty-four members belonged to the Geographical or the Commercial Geographical Society of Paris. What was their competency to decide between a canal with locks or on a sea-level? Fourteen other members were engineers or assistants of some sort on the Suez Canal. What was their impartiality between M. de Lesseps and others? And, among the others, if one takes count of personal friendships and of the prestige exercised by a great name, how many more will remain?" The writer is a gentleman of character and ability well known in Paris; therefore I feel at liberty to give his view.

The objection to Nicaragua, based on the destructive effects of earthquakes, is best met by the statement that a high, broken arch-

way of a ruined church in the town of Granada has stood for a quarter of a century against the action of gravitation even, due to the tenacity of the cement—a proof as well of the value of this native product, so essential in large quantities for canal construction, as that earthquakes in that region may be regarded at least without alarm. Berghaus's chart has been appealed to as a proof that the Panama region is not subject to these convulsions, yet on May 1, 1879, three shocks were so severe as to cause consternation along the line of railroad, and at least one heavy shock has occurred this fall. The fact is, the whole Central American region is well known to be subject to them, with a remote possibility of injury, the less serious in proportion as the works admit of repair. In this connection M. Lavalley said, in the discussion before referred to :

“Engineers should not fail to examine all sides of a question. An objection urged against the construction of locks is the frequency of earthquakes. It is, then, a question to consider the injuries which locks would suffer ; they would be simply fissures, and such accidents as are relatively easily repaired. On the other hand, it must be asked, what effects these same earthquakes would produce on a tunnel of forty metres' opening.” (At that time the tunnel was urged, but abandoned later for an open cut more than three hundred feet deep, the side-walls almost vertical.) The reader will naturally ask, What effect would an earthquake have in shaking down these broken rocks into the canal? In short, the relative questions are to be considered as remote possibilities. All of the locks on the Nicaragua Canal, except four, are so planned as to admit of drawing off the water from them without emptying the canal, reducing to a minimum the time of delay and the cost of repair.

The idea expressed by M. de Lesseps in the Congress, that the Americans could very well afford to pay four times the tolls charged at Suez, has singularly enough been omitted in the “Review.” As this is an important question, it seems strange indeed that so candid a man and so disposed to discuss the merits of a canal should have failed to present so important a subject as the rate of tolls.

Touching the matter of the “Monroe doctrine,” I am disposed to support the opinion of M. de Lesseps. When a European nation enters into occupation and domination of American territory as France did under his patron, the late Emperor, during our civil war, we can properly send a polite diplomatic note that we would prefer a withdrawal of its forces, as we did on that occasion. It is

true that, in addition, a force of seventy thousand men under General Sheridan was held on the frontier of Mexico, which may have been regarded as a substantial backer to the note. M. de Lesseps, educated in Eastern diplomacy, as he states in making mention of treasured advice received from Mehemet Ali, will be able to form an opinion as to the relative values of the diplomatic note and of the disposable force.

Respecting the able presentation of the voyages of the ships of Hiram and Solomon to the land of Ophir, of Parnim and Tarshish, I have nothing to say, or, rather, I will concede all he says, and yet have to confess, after looking at the matter in all of its practical bearings respecting the construction of a ship-canal, I am still lost in the merest conjecture. Sentiment should always be respected ; it can not be put in a balance and weighed like gold and silver or precious stones.

M. de Lesseps has so frequently stated that there were fewer engineering obstacles in the construction of the Suez Canal than on many of the railroads in France, that I invite attention to that fact as an answer to his several notes of admiration on page 14 respecting the execution of that work.

He has as frequently said that all the difficulties now urged against the Panama sea-level canal had been urged against the construction of the Suez Canal, so that it was only necessary to substitute Panama for Suez, and it was the same old story. So far as I am aware, no one has suggested that a rainfall of one hundred and twenty-four inches would at Suez cause great damage without the use of lockage to a sufficient height to escape the destructive effects of floods. This physical condition was brought to his notice as existing at Panama, that is to say, a rainfall one hundred times that at Suez.

We learn that M. de Lesseps, accompanied (we hope) by the able engineers "who made plans for ample drainage of the surplus water of the Chagres River," is now *en route* to Panama. Had they arrived at any time between the 20th and 29th of November, they would have had an opportunity of seeing, in the terse language of Sir John Hawkshaw, "how those showers behave."

There is an old story of Canute the Dane, who, surrounded by flatterers, was informed that even the winds and the waves would obey him. He seated himself on the borders of the rising tide and commanded it to halt, but it would not ; so, after all, he found it necessary to leave, somewhat angered, it seems, as he is supposed to

have said to his followers, "Base flatterers, God alone can stay the floods!"

Soon M. de Lesseps will stand where a recent flood filled not only the bed of the stream, but the entire valley. Will his genius provide a remedy? That the floods come in their might is an inexorable fact. The "able engineers" may sing their lullabys to M. de Lesseps; he may take up the strain and give it to the world; and Mr. Nathan Appleton may tell him that after a lecture in Chicago he will get all the money he requires. Will the moneyed world join as a chorus, swelling the note to one of triumph of the mighty forces of man and the insignificance of those of Nature?

The article under discussion closes with these hopeful words: "I do not hesitate to declare that the Panama Canal will be easier to begin, to finish, and to maintain, than the Canal of Suez."

I will assume that the displacement of a shovelful of earth somewhere in the vicinity of the work is not seriously a beginning. In my view, the raising of the necessary funds is the real beginning of the work. After the Congress had formally endorsed M. de Lesseps as the organ of "public opinion," his books were opened with great *éclat* in Europe and even in America; after three days he closed them and announced that, as the amount subscribed was insufficient, the subscribers were at liberty to withdraw the money paid in. His "Bulletin" has been singularly silent respecting the number of shares of stock taken. I have seen an estimate that it amounted to about two per cent. of the sum required. In his address in Washington, Mr. Nathan Appleton expressed the belief that M. de Lesseps would come to this country after leaving Panama, lecture at Chicago, and then the money would be obtainable. Without wishing to interfere with what concerns those gentlemen, it would seem to me that the place to seek a moneyed support would be where "public opinion" demanded a canal *à niveau*—in Paris—where they are both so favorably known.

Respecting the canal *à niveau*, via Panama, Sir John Hawkshaw said, "During the construction of a canal at the sea-level, difficulties would arise in providing for drainage, which would affect both time of execution and cost to an extent that could hardly be ascertained in advance."

These difficulties will not, unhappily, be exorcised. The flood of November last was several feet higher than was indicated by Mr. Menocal in the Paris Congress, in relation to which Lieutenant Reclus asked him if he was "serious." The road-bed of the Panama

Railroad is supposed to be located with the view to secure, as far as possible, immunity from floods, yet the damage sustained, it is stated in recent dispatches, will certainly cause suspension of traffic until January 1st, and perhaps until February. How can any person continue to say that the maintenance of the Panama Canal *à niveau* would be less difficult than that at Suez, when such a flood would seem to be sufficient to almost obliterate it throughout one half of its length, were it now constructed?

It does not require an engineer to appreciate the power of floods in the transportation of silt, bowlders, trees, etc., or to make note of the vast piles accumulated at such points or sections as by reason of greater width of stream, or from a decreased velocity, favor a deposit.

There are certain relations of rainfall, difference of levels, character of bottom and of adjacent lands when submerged, which make up what is known as the *regimen* of a stream, to reëstablish which, in its entirety, requires only a sufficient number of floods, whatever temporary changes man may have effected by dredging.

The silt from the Nile far away makes the maintenance of the harbor of Port Said a matter of grave consideration; last year five hundred and sixty thousand cubic yards had to be dredged from the outer harbor of that port, yet the character of the high waters of that stream and the comparatively small descent per mile make its transporting power very small indeed as compared with the Chagres.

In addition to the physical difficulties affecting the finishing and maintenance of the canal, M. de Lesseps seems to have a concession which would weigh heavily upon the tolls, and it is said that the Panama Railroad demands and has been promised \$14,000,000 in money and \$40,000,000 in canal stock for the road, rolling stock, and franchise. He can very readily enlighten the public in the "Bulletin" in this regard, and as to the statement of his counsel, that the canal will cost 800,000,000 francs, and thus reduce the profits of the stockholders one half (see Appendix, "Journal of Proceedings of Initiatory Society").

In the opinion of M. de Lesseps, "sailing-vessels have come to occupy a very subordinate position in the commerce of the world." Few pass through the Suez Canal, therefore they are doomed and will soon disappear. The fact is, sixty per cent. of the English tonnage between the East and Europe still passes around the Cape of Good Hope, notwithstanding the existence of the canal, which in

1878 was used by but twenty-five sailing-vessels. The statistics of Great Britain indicate that the carrying capacity of her sailing fleet engaged in foreign commerce is double that of all steam-vessels similarly employed, and a steady yearly increase of tonnage in sailing-vessels is also shown; the statistics of the Suez Canal seem also to show that the tonnage likely to pass through it has reached a maximum.

As regards the relative merits for sailing-vessels of the Nicaragua and Panama lines, the subject has been so often and so thoroughly discussed that it hardly admits of further controversy. The opinion of Commander Maury, expressed in relation to Panama, it seems to me should be considered in a qualified sense. It was an expression of the delays that would result to vessels depending upon sailing-power only, unaided by tugs over very considerable distances. He said that if an earthquake should rend the continent asunder at Panama the strait would be unused by sailing-vessels, from the prevalence of calms in that region. It seems to me that it would lead to the employment of very many towboats and towage through this region, which in certain directions has less distance to where winds may be found than in other directions.

The region of Greytown on the Atlantic coast and Brito on the Pacific are almost exempt from calms. By reason of the winds favoring both outward and return voyages, sailing-vessels would, for a long period at least, be the most considerable factor through the Nicaraguan Canal.

I have endeavored to follow the paper of M. de Lesseps and point out certain grave errors into which he has fallen, and have done so with less chagrin, as it may enliven the canal question to him and in a measure alleviate his disappointment expressed at the absence of a serious opposition. It has been necessary to allude to points not presented by him, such as his proposed rate of tolls, and to discuss some of the general features of the question; but the intelligent reader who has no previous knowledge will be able to form only a partial and a not very intelligent opinion by reading the paper of M. de Lesseps and my reply.

Within the past three years I have prepared three papers for the American Geographical Society of New York, which contain all the information I possess touching the economy and the possibilities of an American interoceanic ship-canal.

DANIEL AMMEN.

APPENDIX.

Articles of Agreement of the International Society for cutting an Interoceanic Canal through the Isthmus of Darien, August 19, 1876.

ARTICLE I. A mutual society is hereby formed by the subscribers, with the following objects: 1. To cause to be made by chosen engineers the general outline and estimates for an interoceanic canal, without locks or tunnels, across the Isthmus of Darien, following first and foremost the track indicated by M. Gogorza.

ART. IV. . . . It is now agreed that after the meeting of delegates from the Geographical Societies, under the presidency of M. de Lesseps, to take place at Paris in October, General Türr will resign in favor of M. de Lesseps the presidency of the Board of Directors, then to be elected.

ART. VIII. . . . of the six remaining beneficiary shares, two are to be placed at the disposal of General Türr, and, of the four others, two shall be allotted to M. Wyse, who will conduct the expedition, and two others are to be reserved for a purpose known to the persons interested.

Extract from the Proceedings in General Meeting of the International Civil Society of the Interoceanic Canal, held June 10 and 17, 1879.

The subscribers to the International Civil Society of the Interoceanic Canal met on the 9th inst., at Rue Mogador. . . .

The President then declared that a quorum of the Society was present, and pronounced the following words:

" . . . Whoever, then, builds the canal, our Society will have given the initiative to the work. We hoped that it would push the execution of the work under the direction of the illustrious founder of the Suez Canal; but M. Ferdinand de Lesseps, who for four years has assisted us with his advice, has now decided to prosecute in person the realization of this immense enterprise, and desires that our Society should concede to him its work and its interest, only preserving in the company which he is about to form the interest resulting from our share of the capital." . . .

A MEMBER: "Our concession stipulates that, if the route for the canal through the United States of Colombia is adopted, the share of the conceding Society shall be ten per cent. of the stock capital raised for building the canal. It being thought necessary to raise a total capital of eight hundred million francs, it will be no doubt preferable to restrain the shares to a total value of four hundred millions. In this case our right would be forty millions, if we insisted on interpreting the letter of our contract; but it is evident that this figure is too large, and that we can not maintain it. . . . I am of opinion, therefore, that our Society should demand fifteen million francs for its concessions." . . .

After a long discussion, in which all the members of the board of the conceding Society took part, the sum was fixed definitely between them at fifteen million francs.

M. Ferdinand de Lesseps then said: "Your declarations are loyal, and I take pleasure in telling you so; but I will be obliged to ask you to make me a written proposition. I said to General Türr: 'If your Society is in a position to prosecute the work, I do not seek to interfere, and I retire; but in the contrary case, as I shall have all the responsibility, I do not desire partners in what concerns the subscriptions, nor engagements with any one.'" . . .

"Two days after, in answer to our proposition, M. de Lesseps sent us an opinion, drawn up by his counsel, of which the following is an abstract:

"I. By the terms of this document, M. de Lesseps not only enters into this negotiation with his name and moral influence, but with a positive determined right of intervention.

"The act of incorporation of the conceding Society declares that the presidency shall be offered to him; therefore he might have identified himself with our Civil Society, in which he, as president, would have had the casting vote, in case of division.

"His official influence has been, nevertheless, important. Messrs. Wyse and Reclus undertook the exploration by his advice, and the confidence of capitalists was stimulated by the certainty that he would put himself at the head of the enterprise when the moment of execution should arrive. M. de Lesseps summoned the Congress and brought together the former engineers of Suez, by whom the technical and statistical problems were solved. The estimate of probable revenues, on which will be based the appeal to capital, is the work of the Congress presided over by M. de Lesseps, and the programme for the execution of the work will result from the labors of the Congress as much as, if not more than, from the investigations of the Civil Society. Finally, the vote of the Congress has conferred on M. de Lesseps a new right, inasmuch as a part of the votes were influenced by the confidence with which he inspired the electors.

"Supposing that the Society should sell its right, could it do so without remunerating M. de Lesseps and his colleagues? If M. de Lesseps claims nothing, his refusal to claim can not benefit the Civil Society, and its shareholders should reckon with M. de Lesseps.

"II. What is the real value of the concession? Ten per cent. of the capital is reserved to the Civil Society. This capital, taken at the moment of opening the negotiations for concession, was valued at four hundred million francs, which would give forty millions to the Society. At present the capital should reach eight hundred millions, which would make the society's share eighty millions. But this increase of expense would diminish and not increase the advantages reserved to the founders of the Society, which in any case can not be greater than forty million francs.

"The Civil Society, not having fulfilled the obligations which the concession imposes in compensation for the advantages ceded (since it still remains to organize the company of execution), has only accomplished the first part of its work—important, no doubt, but only partial.

"The ten per cent., say forty millions, would be conceded without con-

test if the canal were already open for navigation ; but the Society's right in this claim is only proportionate to the expenses which it has incurred.

"If M. de Lesseps should express his private opinion, he would say that the cost of the enterprise having been estimated at first at four hundred million francs and the share of the Society at forty millions, but the canal costing ultimately eight hundred millions, and the profits of shareholders diminishing one half, the share of the privileged beneficiaries should be diminished in the same ratio, that is, reduced to twenty millions ; and, on the other hand, the original founders of the Society being exonerated, by their concession to the company of execution, from a part of the charges equal in importance to those already incurred by them, ten millions should be given to the original members and the other ten millions reserved to the new members, who will have to bear the heavy expenses to be incurred up to the completion of the maritime canal.

"III. Whether the figure ultimately accepted by M. de Lesseps be ten or fifteen millions, the 'opinion' proposes to reserve, at the time of subscription, ten or fifteen millions of stock which shall be allotted to the founders and members of the Civil Society. This stock shall be credited with disbursements already made by the stockholders, in proportion to such disbursements, and the shares shall be delivered to the beneficiaries on the day on which they are taken up. This deposit will be a partial but effective representation of the guarantee offered by the Civil Society to the new company."